ATTORNEY DOCKET
090936.0506
Client Ref. No. 2979-03

PATENT APPLICATION
10/725,249

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Dorel Marius Necsoiu et al.
Serial Number:	10/725,249
Date Filed:	December 1, 2003
Examiner:	Monica M. Pyo
Group Art:	2161
Confirmation No.:	1933
Title:	**INFORMATION SHARING SYSTEM FOR GEOGRAPHICAL DATA**

Honorable Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

SUPPLEMENTAL DECLARATION OF DOREL MARIUS NECSOIU AND DECLARATION OF BRANDI WINFREY SUBMITTED PURSUANT TO 37 C.F.R. § 1.131

We, Dorel Marius Necsoiu and Brandi Winfrey, hereby declare and state that:

1. We are co-inventors of the subject matter and claims of the above-referenced patent application entitled ***Information Sharing System for Geographic Data***, filed on December 1, 2003 (the "Application"), and having a priority date of January 13, 2003.

2. The Examiner has rejected Claims 1-14 under 35 U.S.C. § 103(a) in an Office Action mailed June 7, 2006. The rejection was based on Publication "Metadata and GIS: An ESRI White Paper", published on October 2002 (hereafter ESRI).

3. The invention that is the subject of the Claims 1-14 and newly added Claim 15 was both conceived and reduced to practice before October 2002 (the publication date of ESRI).

4. Such conception and reduction to practice is evidenced by the Invention Disclosure (including the Description) attached as Exhibit A. We signed the cover page of the Invention Disclosure on August 15, 2002, after the Description (pages 1- 8) was completed. The Invention Disclosure fully describes the subject matter of the claims of the above-referenced patent application.

5. The Invention Disclosure was duly submitted to the Legal Department of Southwest Research Institute (SwRI), as evidenced by the notation "Date Received 08/15/2002" at the top of the form. It was duly received by SwRI legal personnel and assigned an internal invention disclosure number, which indicates that the receiving legal personnel independently verified the date of receipt. These events were all in accordance with standard procedure in place at SwRI for invention disclosure.

6. The conception date redacted from Item 4 of the cover page of the Invention Disclosure is prior to all other dates on the Invention Disclosure, and in particular, prior to the filing date of ESRI.

7. The reduction to practice of the invention is referred to as The Olympus DISS system, and its implementation is referred to by that name throughout Exhibit A.

7. The invention was reduced to practice, as well as conceived, prior to October 2002. Exhibit A contains screenshots of displays generated by software that implements the invention. The screenshots are filled with actual data, proving that the invention was operational. The screenshots also include a copyright notice for "Olympus v1.00 lasted updated 01/25/02", further proving that the invention was reduced to practice.

8. It should also be noted that Exhibit A describes the invention as being reduced to practice. Specifically, the invention is described as software that "runs", i.e., is being executed on hardware. For example, on page 2 of the Invention Disclosure, it is stated that "the system was developed and runs" on a certain platform. Also, that it "currently runs" on a certain operating system.

9. As further evidence of reduction to practice before October 2002, Exhibit B is a letter describing the status of the invention. This letter is dated September 13, 2002, is authored by our employer, Southwest Research Institute, and clearly refers to the same invention as does the Invention Disclosure (the Olympus DISS). The letter states that "all programming and internal testing of the system has been completed".

10. All work on the invention was performed in San Antonio, Texas.

11. We hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. Further, we declare that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the Application or any patent issuing thereon.

Date: 8/21/2008

Dorel Marius Necsoiu

Date: 8/21/2008

Brandi Winfrey

SwRI PROPRIETARY

INVENTION DISCLOSURE*

1. Title: Olympus Data and Information Sharing System (Olympus DISS) Docket No. 2979

Date Rec'd 08/15/2002

2. Object: Olympus DISS is an intranet web-based geographical data and information sharing system that allows access to data at its source. Olympus uses established data standards, provides a flexible mechanism to build applications upon, and supports output of geographic data in multiple and clear ways.

3. Name of inventor(s) (typed): Dorel Marius Necsoiu (designer), Brandi Winfrey (web page developer)

4. Date first constructed or formulated (if applicable): August 2001

5. Previous or planned publication or public disclosure: U.S. Nuclear Regulatory Commission, Internal Meeting, Rockville, Maryland, August 8, 2001

OLYMPUS—A Readily Implemented Geographic Data and Information Sharing System
Title

Name of Publication	Vol.	Issue	Page(s)	Date
EOS (to be presented at 2002 Annual Fall Meeting, December 2002)				

6. INVENTOR(S): (I) (We), the undersigned, certify that (I)(We) first conceived the within invention on 6/26/2002 and that it is fully described in the attached disclosure on pages numbered consecutively 1 through 8

Signature in full [signature] Date 8/15/02

Signature in full [signature] Date 8/15/02

Signature in full _____ Date _____

7. WITNESSES: We, the undersigned, certify that the invention described in the attached disclosure was explained to us and that we understand the same.

Signature in full A. Laurie McKayne Date 08/15/02

Signature in full Rebecca A. Emmot Date 08/15/2002

FOR DEPARTMENT DIRECTOR ONLY

8. ☐ The described invention *was not* conceived or first reduced to practice as the result of work on a sponsored research project.

☒ The described invention *was* conceived or first reduced to practice as the result of work on a sponsored research project.

Project No. 20.01402.471 Contract No. NRC-02-97-009 8/26/02

Sponsor: NRC Nancy Sridhar

9. Summary recommendation to Patent Committee: File provisional patent.

[signature] Date 8/15/2002

Department Director

*(See Instructions on Reverse)

(SwR-35)
FORM OP-2
REV 12/82

SwRI PROPRIETARY

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INVENTION DISCLOSURE DESCRIPTION

Olympus Data and Information Sharing System™ (also know as Olympus DISS™ and Olympus™) is an intranet web-based geographical data and information sharing system that allows access to data at its source. Olympus™ uses established data standards to provide a flexible mechanism to build applications upon and outputs geographic data in multiple and clear ways.

The system software is centralized, using several software components (Figure 1):

- a Commercial Off the Shelf (COTS) software component, ArcCatalog, produced by ESRI, Inc. (www.esri.com);
- two public domain packages, MP and Isite information system, produced by USGS (www.usgs.gov) and CNIDR (www.cnidr.org), respectively;
- one public domain GIS visualization software, Arc Explorer, produced by ESRI, Inc;
- an in-house software component, Harvester, produced by CNWRA.

The search and retrieval mechanism is querying a metadata database, having each record associated with a specific geographic dataset. Olympus™ can ingest metadata associated with a variety of geographic datasets in binary formats, including but not limited to ESRI GRID, ERDAS IMAGINE, TIFF, MrSID, JPEG, BIL, BIP, BSQ, Windows Bitmap, GIF, ERDAS 7.5 LAN, ERDAS 7.5 GIS, ER Mapper, ERDAS Raw, ESRI GRID Stack File, DTED Level 1&2, ADRG Image, ADRG Overview, ADRG Legend, PNG, NTIF National Imagery Transfer Format, CIB, CADRG or CIB Frame. Data operator(s) make their data and metadata available to Olympus™ by placing it in a designated repository area. Periodically the Olympus™ system harvests metadata and automatically builds an index and a relational database with metadata information.

Olympus™ provides Spatial (Geographic), Keyword, and Temporal search and retrieval capability for an in-house repository of geographic metadata. It does this through a web-based graphical user interface. This user interface consists of a login page (Figure 2), search page (Figure 3), result page (Figure 4), and metadata pages (Figure 5).

The three options under search page - Spatial, Keyword, and Temporal - may be selected independently of or in conjunction with each other to better define the user's search. If an error has been made in the selection process, the user can Reset the page back to its original default values and begin selecting again. After making all of the desired selections, the user has the option to set the maximum number of responses to view on the result page before finally submitting the query.

The result page (Figure 4) lists the term(s) queried for, the number of matching records found, the number of records currently being viewed, and the titles and links to metadata describing the available data. From this page, the user can go to the metadata page for each geo-dataset (Figure 5). Each metadata page provides information of how to download data. For a quick visualization, a version of the original data is provided in a format compatible with Arc Explorer, and ESRI GIS free viewer.

The ArcCatalog component of the Olympus™ system allows users to look for the map they want to print, draw a coverage or page using the values in a table and determine the coordinate system of the geographic data. ArcCatalog provides the metadata editor that is used to document any new added set of geographic data. The Catalog will fill in as much information as it can using the data properties, however the user will need to fill certain descriptive data in a few specific fields such as the dataset abstract, purpose, point of contact or calendar date. Inherent metadata, which is metadata that is delivered from the data, is generated automatically.

INVENTION DISCLOSURE DESCRIPTION

Hardware and Software Requirements

- Target platform(s):

  The system was developed and runs on Silicon Graphics workstations. The Graphical User Interface was developed on Windows and can be run on any platform with a web browser (IE) application available.

- Operating System(s):

  Olympus™ currently runs on SGI Irix, but can be ported easily to other platforms such as NT and Linux.

- Programming language(s):

  Java, JavaScript, HTML, VB and Perl

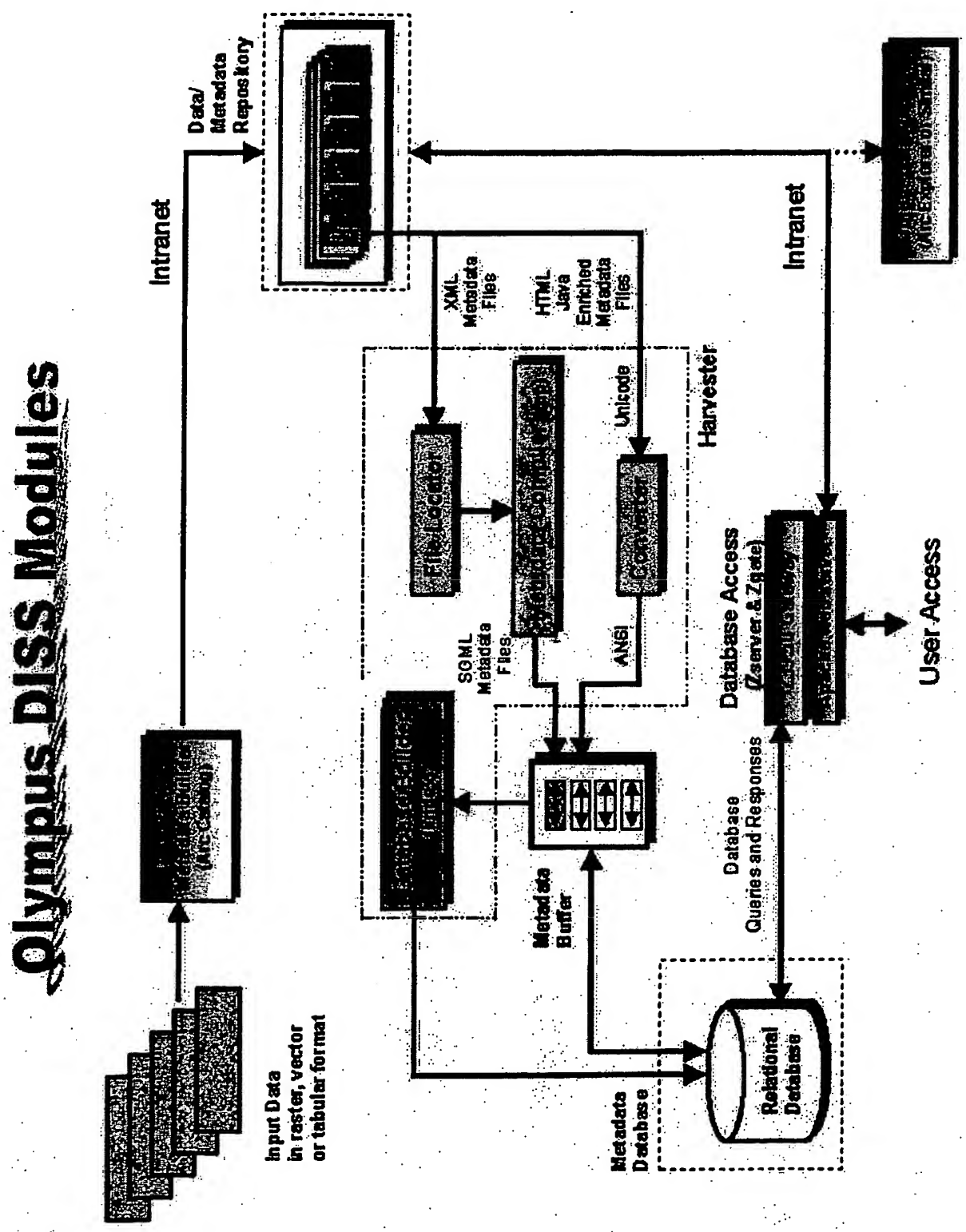

Figure 1 Olympus DISS™ – System Components and Data Flow

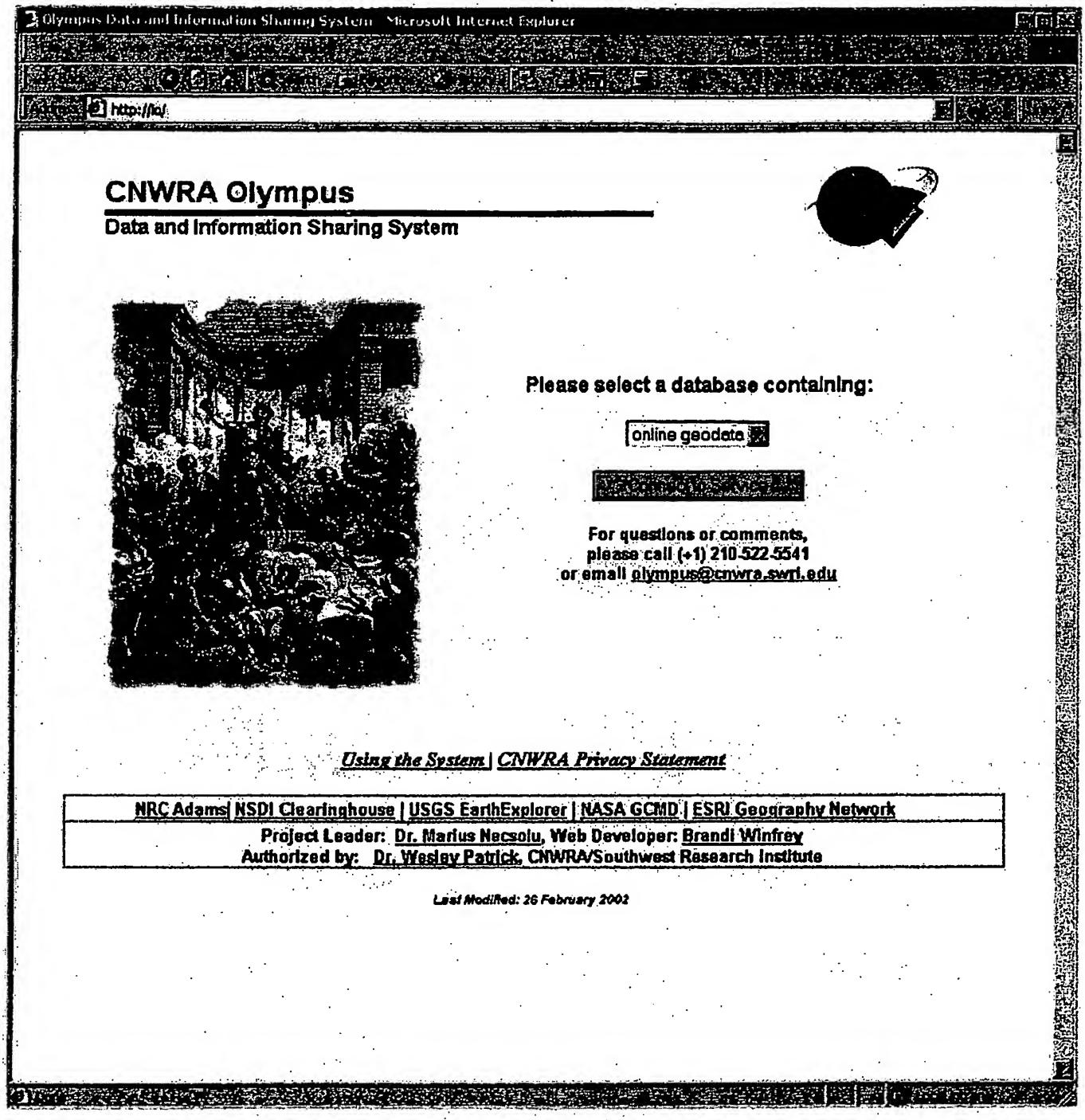

Figure 2 User Interface - Main Page

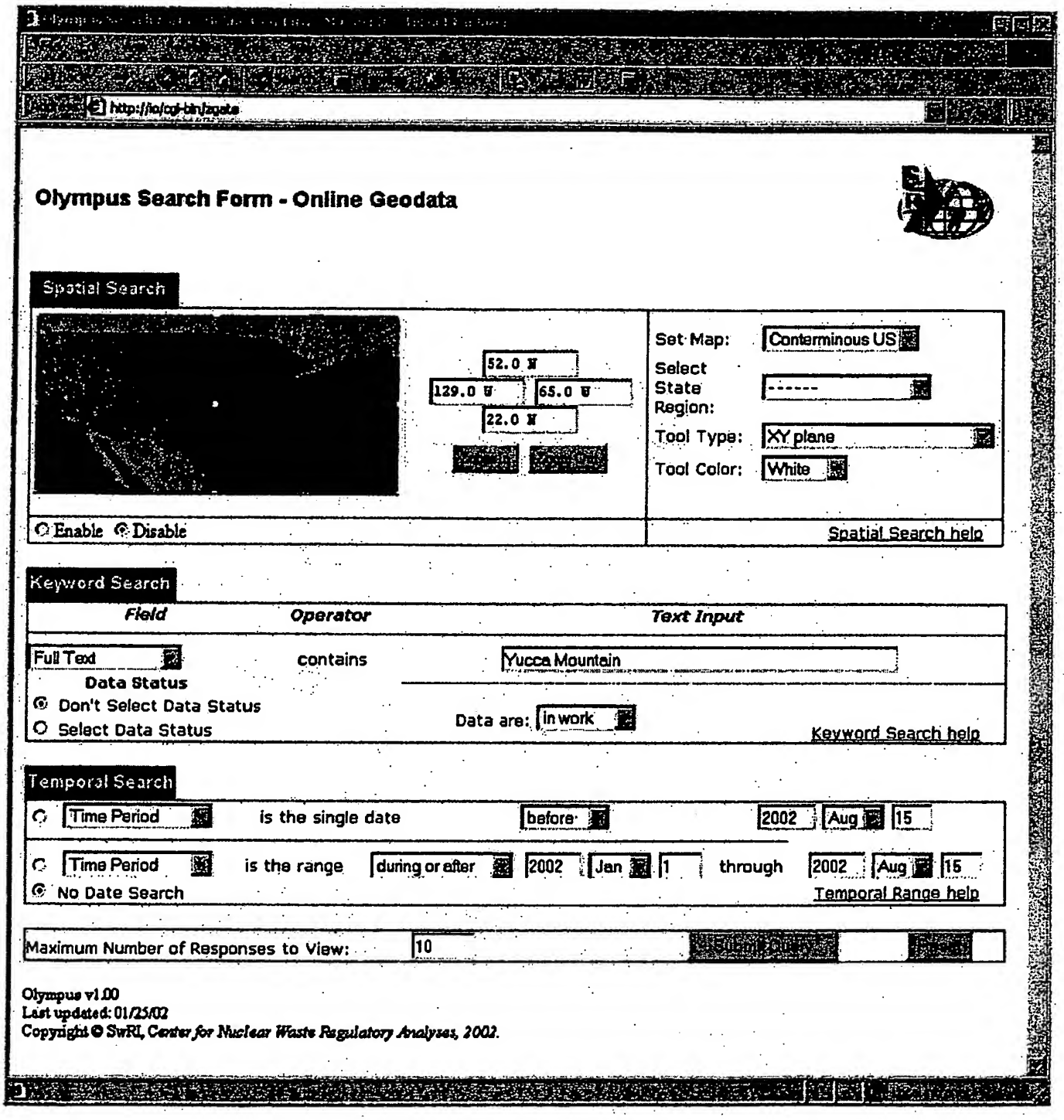

Figure 3 User Interface - Search Form

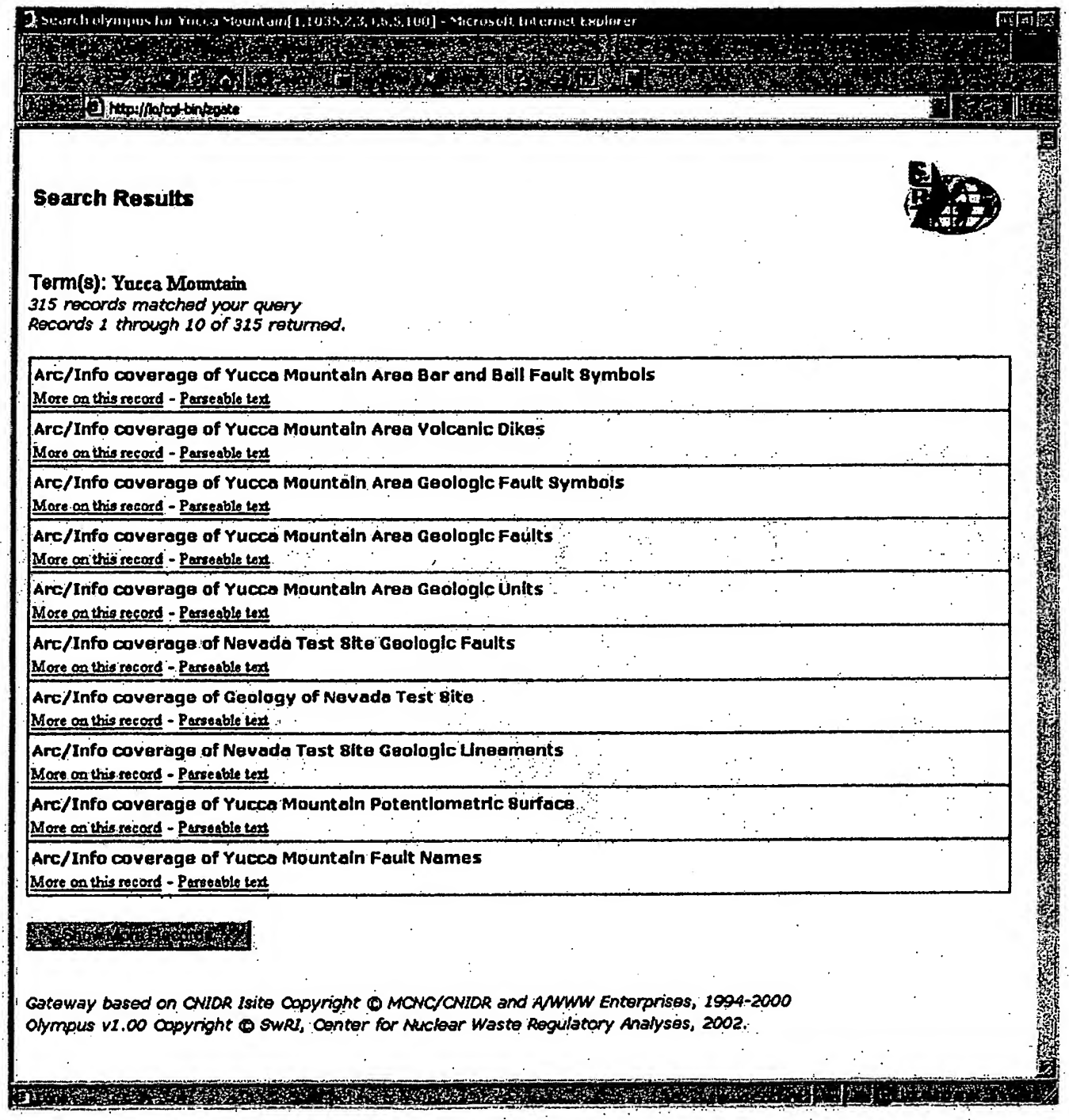

Figure 4 User Interface – Results Page

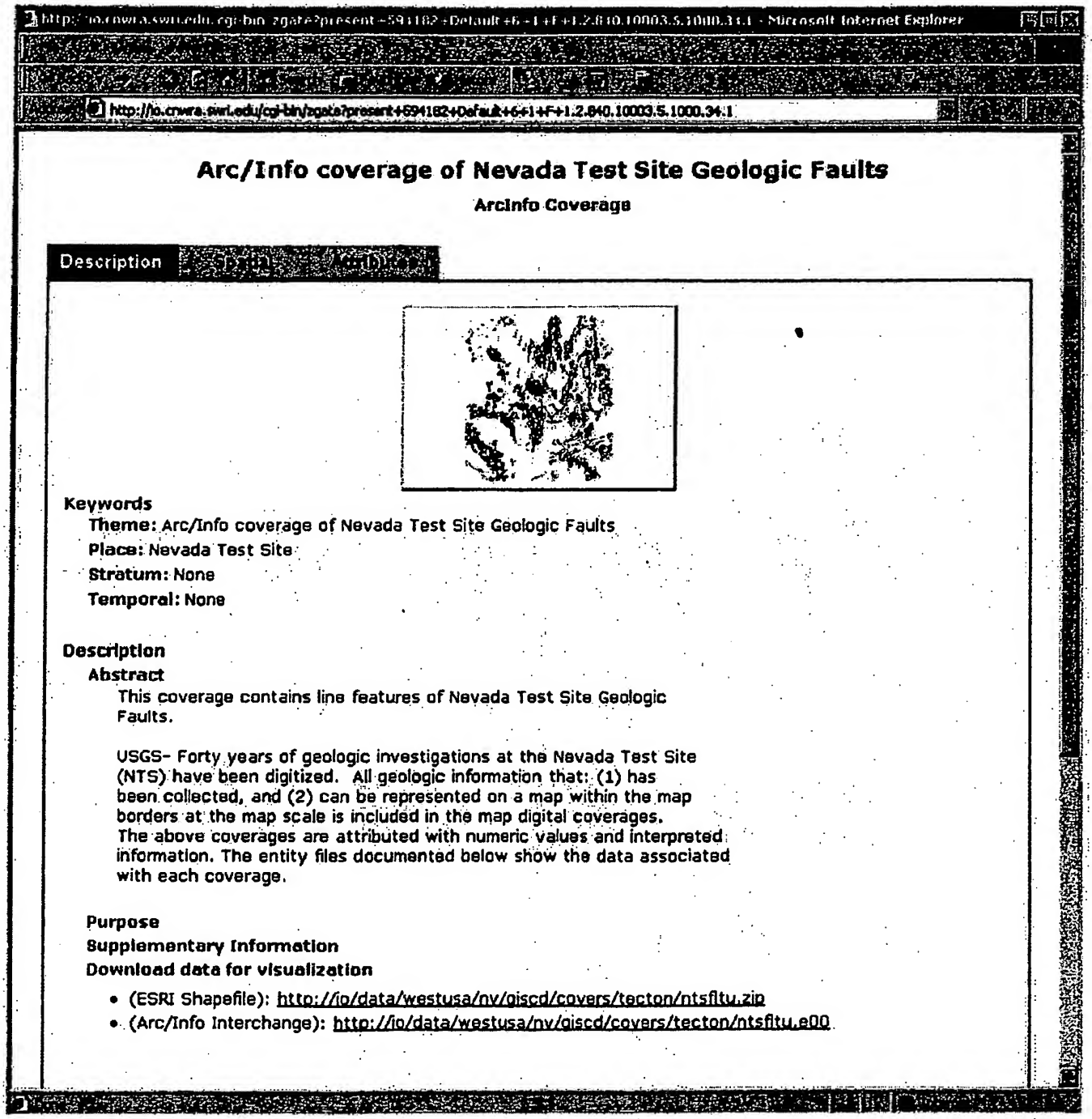

Figure 5 User Interface – GIS Metadata/Download Page

INVENTION DISCLOSURE DESCRIPTION

Olympus DISS™ allows for fast and easy access to a centralized geographic data repository, as well as better data management at minimal cost for the implementation and operation of the system. Olympus DISS™ could significantly reduce or even eliminate redundant geographic data. In the Olympus DISS™, metadata records are the basis for searching and retrieving geographic data.

Claims:

a) Olympus DISS™ has a modular structure, data/metadata flow model and software interface that allows archiving and retrieval of geographic data at its source.

b) Olympus DISS™ is an inexpensive turnkey solution for managing geographic data.

c) Olympus DISS™ combines the capabilities of the powerful metadata management tool provided by ESRI's ArcCatalog with the flexibility, scalability and low cost of the Isite, MP, and Harvester packages. ArcCatalog does not have a repository or metadata server, so it lacks the capability for distributed structured metadata search that is provided by Olympus DISS™. By combining Isite, Harvester, and ArcCatalog, users can benefit not only from the strengths of each tools but also from their synergy.

d) By using ArcCatalog capabilities, the time and resources required for entering/managing metadata records is reduced.

e) Olympus DISS™ standardizes the online access to GIS data. This provides a quick way to visualize and manipulate geographic data by providing it in a universal format (.shp – vector and .sid/.tif – raster) that is easy to open in a variety of geodata viewers such as ESRI's ArcExplorer.

f) Real time capability of searching and retrieving metadata and geodata.

INVENTORS:

Signature	8/15/02 Date	**WITNESSES:**	
Signature	8/15/02 Date	H. Lawrence McHugue Signature	08/15/02 Date
Signature	Date	Rebecca A. Ennet Signature	08/15/2002 Date

Form OP-2A
Rev. 7/66

CNWRA *A center of excellence in earth sciences and engineering*

A Division of Southwest Research Institute™
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September 13, 2002
Contract No. NRC–02–97–009
Account No. 20.01402.471

U.S. Nuclear Regulatory Commission
ATTN: Dr. Philip S. Justus
Office of Nuclear Material Safety and Safeguards
TWFN Mail Stop 7 C6
Washington, DC 20555

Subject: Status of the OLYMPUS Data and Information Sharing System™

Dear Dr. Justus:

This letter is intended to bring you up-to-date on the current status of the OLYMPUS Data and Information Sharing System™ (OLYMPUS DISS™). This system is designed for the storage, cataloging and retrieval of geographic information. It has recently been modified to allow for the storage and retrieval of non-geographical graphical information (e.g., photographs, tables, charts, graphs). This latter option is intended to facilitate the NRC's program in Public Outreach, but should be of value to other parts of the High-Level Waste program as well. All programming and internal testing of the system has been completed. To date, 763 records have been entered into the online part of the system and 531 records have been entered into the offline portion of the system. The non-geographic (i.e., outreach) section contains 77 online records. We are ready to brief NRC staff and provide a demonstration of the OLYMPUS DISS™.

We would like to demonstrate the OLYMPUS DISS™ in early October. At that time we can discuss NRC access and utilization of the system. If you have any questions, please contact me at 210-522-5183.

Sincerely yours,

H. Lawrence McKague
Element Manager, GLGP

rae
Attachments

cc: J. Linehan
W. Reamer
J. Schlueter
D. DeMarco
D. Riffle
B. Meehan
J. Greeves
S. Wastler
K. Stablein
L. Campbell
C. Trottier
J. Trapp
N. Coleman
W. Patrick
CNWRA Directors
CNWRA Element Managers
M. Necsoiu
T. Nagy (SwRI Contracts)

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CAPABILITY DEVELOPMENT:

OLYMPUS

THE CNWRA's DISTRIBUTED DATA AND INFORMATION SHARING SYSTEM

Author: Marius Necsoiu

TABLE OF CONTENTS

1. BACKGROUND AND RATIONALE; RECOGNIZING THE NECESSITY FOR THE DEVELOPMENT OF A DATA AND INFORMATION-SHARING SYSTEM FOR GEOSPATIAL DATA AT THE CNWRA

Electronic information technology has become a crucial component of business, government and other organizations. In this technology era, many enterprises are moving away from the perception that their information repositories are only a tool for decision-making. The most important asset has become the knowledge-base itself.

Faced with the difficult task of managing information garnered during its entire operational life span, as well as creating a knowledge-base system that will allow researchers to quickly and easily search and access a variety of data, the CNWRA initiated tasks to identify the requirements for designing such a system. The key design criteria are:

a) The system should allow ingestion of different data formats (i.e., raster , vector - shapefiles/coverages, and tabular data);

b) Maximize our investment; the system should be "self-enriching". The collection of data requires a considerable investment of time and money. To reduce this investment, the system should have a friendly interface. Handling data should be as simple as accessing the Internet, so the researchers could focus on analyses or algorithm development, rather than on format conversions that can take so much of their time.

c) Maximum exposure; to get maximum value, the system should include the ability to access data over the Intranet and, if necessary, Internet.

d) Controlled access; the designed system should provide a way to determine and control how and to whom data and services are delivered. Each researcher that is building datasets should have programmatic control as to whether their data holdings are accessible to only CNWRA/NRC or are made available to general public.

e) Scalable System: the system should be easily scaled to meet new and continuing demands.

In addition to the key design criteria this system should:

- Encourage and establish the use of best practice in the production of high quality data, information, products and services.
- Increase the diversity and breadth of users and uses of CNWRA's data, information, products and services.
- Stimulate cooperation and a coordinated, integrated approach to spatially related policy issues, by facilitating data sharing.

- Ensuring that data and information are readily accessible and easily exchanged between CNWRA users, CNWRA and NRC, and where appropriate, to the general public.

The proposed name for the distributed information sharing system (DISS) is Olympus (after a mountain in Thessaly that in Greek mythology is the abode of the gods). Olympus can be envisioned as a vanguard in transforming CNWRA to a **knowledge base enterprise**. CNWRA is staffed by knowledgeable workers who create, circulate and exploit information. This information is a significant component of the organization's accumulated intellectual capital, in electronic form. Just finding data could be a chore without a systematic organization of it.

1. PROJECT OVERVIEW

2.1. Generating metadata

One of the key-component of the proposed geo-information infrastructure is the spatial metadata. Metadata or meta-information is descriptive information about the content, quality, condition, provenance and other critical characteristics of a data set. Metadata could be also described as a common set of terminology, defining (potentially disparate) data to facilitate consistent collection, indexing, querying and publishing (Appendix1).

Metadata will:

(1) facilitate identification of data by search and retrieval mechanisms, based on user's selection criteria, e.g. the "card catalog" type of descriptive information about a data set, and

(2) assist a user to fully understand the data content and evaluate the usefulness of it, i.e. dataset documentation.

Figure 1 illustrates the role and position of metadata in a generic geo-information infrastructure. The internal user with the dual role as creator and user of metadata, will be able to search /browse all non restricted metadata. The data warehouse consists of a relational database plus one or more ftp/http servers that host the geodata.

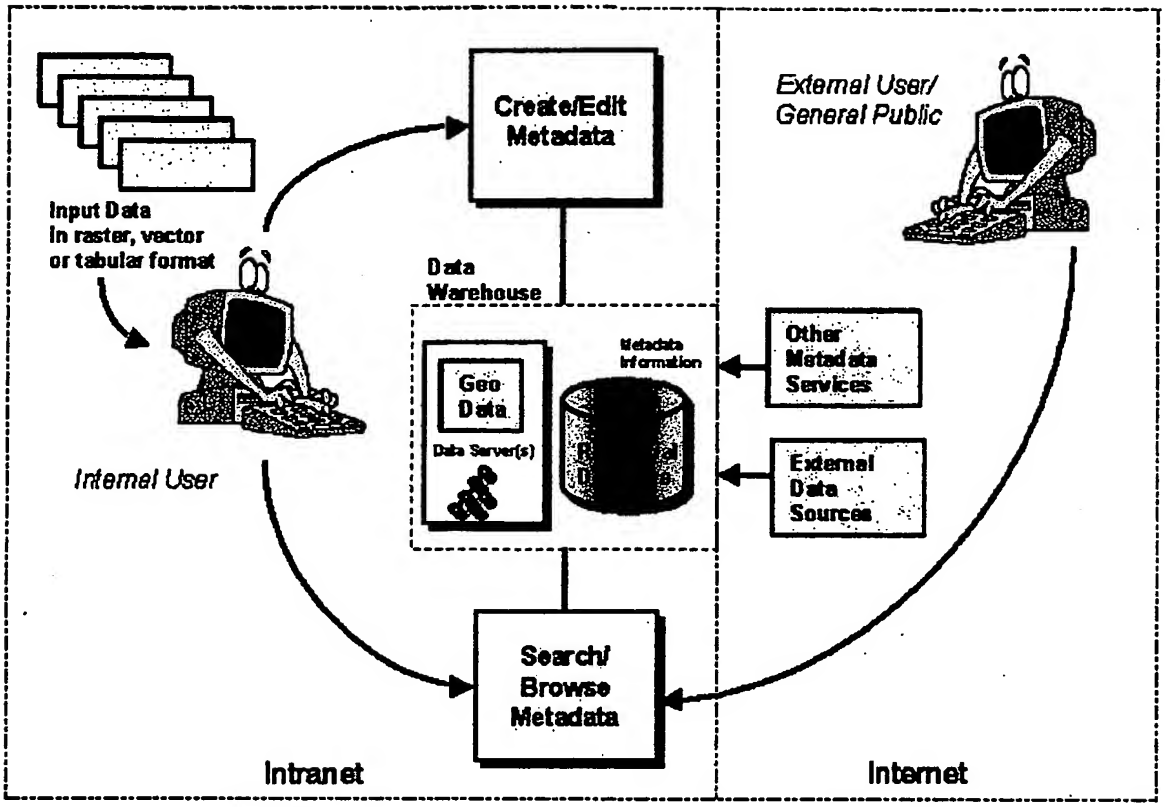

Figure 1. Metadata role and position in a geo-information infrastructure.

All spatially related data will be documented using the Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM Version 2 - FGDC-STD-001-1998). This standard was developed from the perspective of defining the information required by a prospective user (FGDC, 1998) to:

- determine the availability of a set of geospatial data,

- determine the fitness of the set of geospatial data for an intended use,

- determine the means of accessing the set of geospatial data, and

- successfully transfer the set of geospatial data.

If data were obtained from remote sensing sources the FGDC's Content Standard for Digital Geospatial Metadata: Extensions for Remote Sensing Metadata will be used as well. This standard is currently under public review through August 31,2001.

There will be a set of editing tools included as a component of the proposed Olympus DISS, that will assist staff in the process of categorizing their data (defining metadata)

and to compile it into FGDC compliant format. The numbering scheme assigned by these tools will be the same numbering scheme used in the FGDC Content Standard for Geospatial Metadata Workbook (FGDC, 1998).

Typically, providing data sets to the public is a very labor-intensive and expensive endeavor. The original paradigm of the proposed Olympus DISS resides in the fact that all CNWRA technical staff will contribute in generating information records. Therefore, each researcher will process and organize data as well as create searchable keywords. To facilitate this process, examples, templates, a glossary of terms and a tutorial will be available, via the user interface. By distributing the workload, the actual monetary and labor expenditures are efficiently distributed among the staff familiar with their own data.

The metadata with its logical model will be translated into an implementation schema in eXtensible Markup Language (XML). This allows the metadata to be directly viewed using commonly used and publicly available web servers and search engines, as well as possible use as input for a metadata harvester/parser to populate a local database (Figure 2).

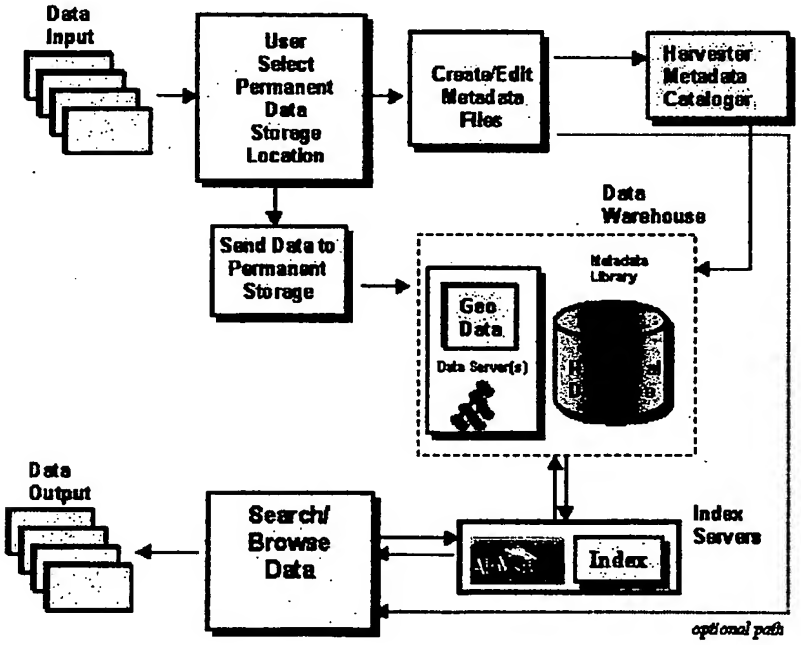

Figure 2. Proposed CNWRA Olympus Data and Information Sharing System (CNWRA DISS)

A web-based interface will allow an effortless data access and interpretation regardless of the computer or operating system used. These are several options for design of a search and retrieval interface. One example, based on the Federation of Earth Science Information Partners (FESIP, 2001) template is presented in Figure 3.

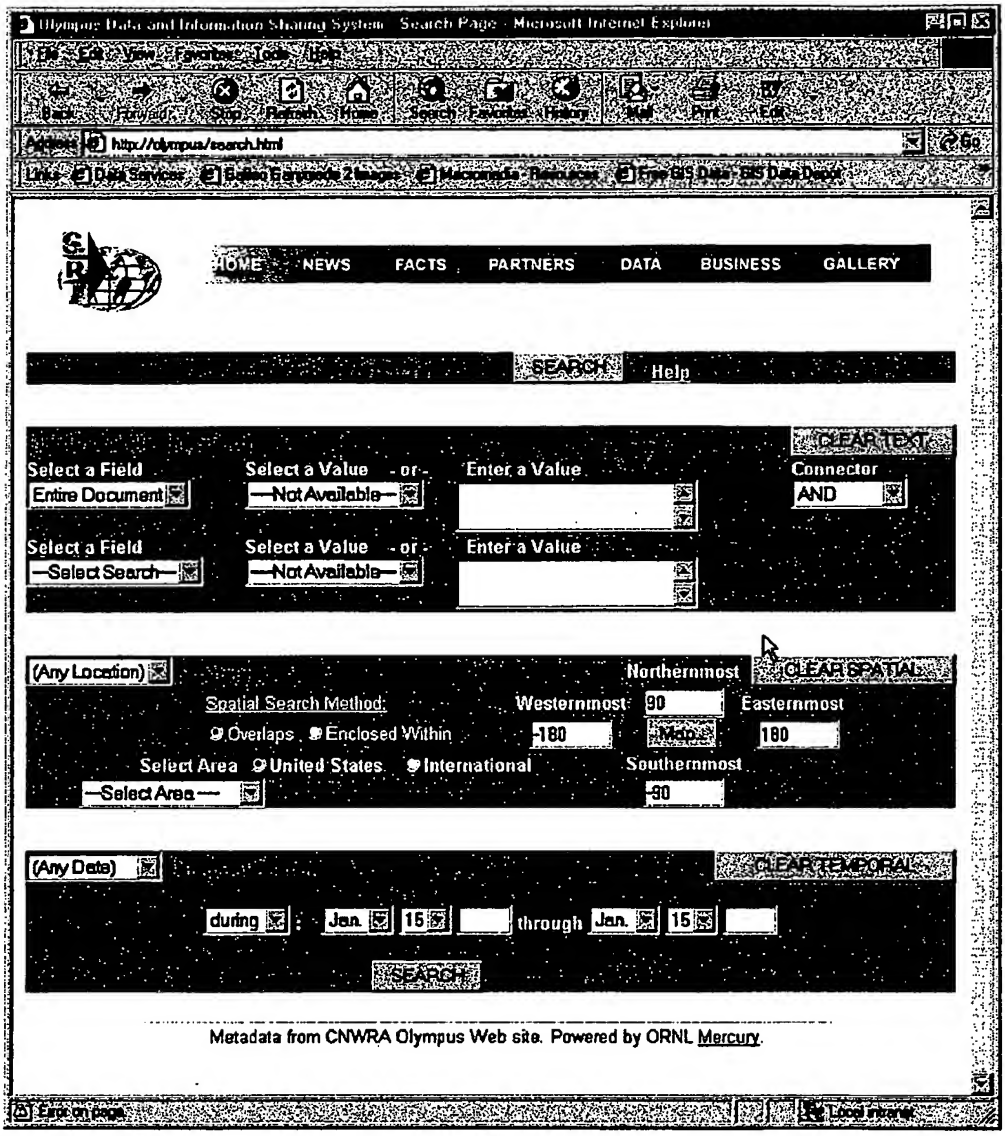

Figure 3. Olympus DISS - example of a typical search page design

2.2. The Oak Ridge National Laboratory's Mercury system

Distributed DISS has been successfully implemented to other research facilities. The Mercury System was designed by Oak Ridge National Laboratory (ORNL) from a large variety of tools, concepts and ideas regarding data and information sharing systems.

What are the characteristics of Mercury that make it attractive for our project? Mercury provides a easy to use powerful data management tool that easily handles dynamic data, yet is inexpensive to operate and maintain.

Mercury is a Web-based system designed to search for metadata and to retrieve associated data. It was selected as an ESDIS prototype project by NASA and is used in a variety of US government projects (ORNL, 2001). Mercury incorporates a number of important features:

- Puts control in the hands of investigators or other data providers;
- Is relatively inexpensive to implement;
- Is implemented using Internet standards, including XML;
- Supports international metadata standards, including FGDC;
- Is compatible with Internet search engines.
- The harvesting and index mechanisms are based on COTS software, including Blue Angel Technologies' MetaStar® products and Hummingbird's Fulcrum SearchServer®;
- The metadata editor is public domain software.

Mercury's concept is to keep data and metadata (describing the data) local on a provider's machine (Macintosh, UNIX, and PC). The data providers simply use the metadata editor to document their data and activate a local web server (no special or licensed software is needed to provide the documentation to Mercury).

The proposed CNWRA Olympus DISS design is similar but not identical with the Mercury paradigm. Owing to the internal architecture and diverse activities of the CNWRA environment, the harvesting mechanism will be implemented and service metadata files located on different directories but on **only one** central repository system. In addition, Olympus will allow both metadata and data files to be uploaded the only constraint will be that metadata content should point where the new location of data will reside on the CNWRA system.

Figure 4. presents the conceptual design of the Olympus DISS using the ORNL's Metadata editor and several commercial and public domain software packages such as: NOAA's Metadata Collector, USGS's mp Metadata Compiler, the Blue Angel Technologies' MetaStar® products and Altavista SearchServer. Appendix 2 includes snapshots of the Olympus main page, Olympus login page and Olympus Metadata Uploader/Editor.

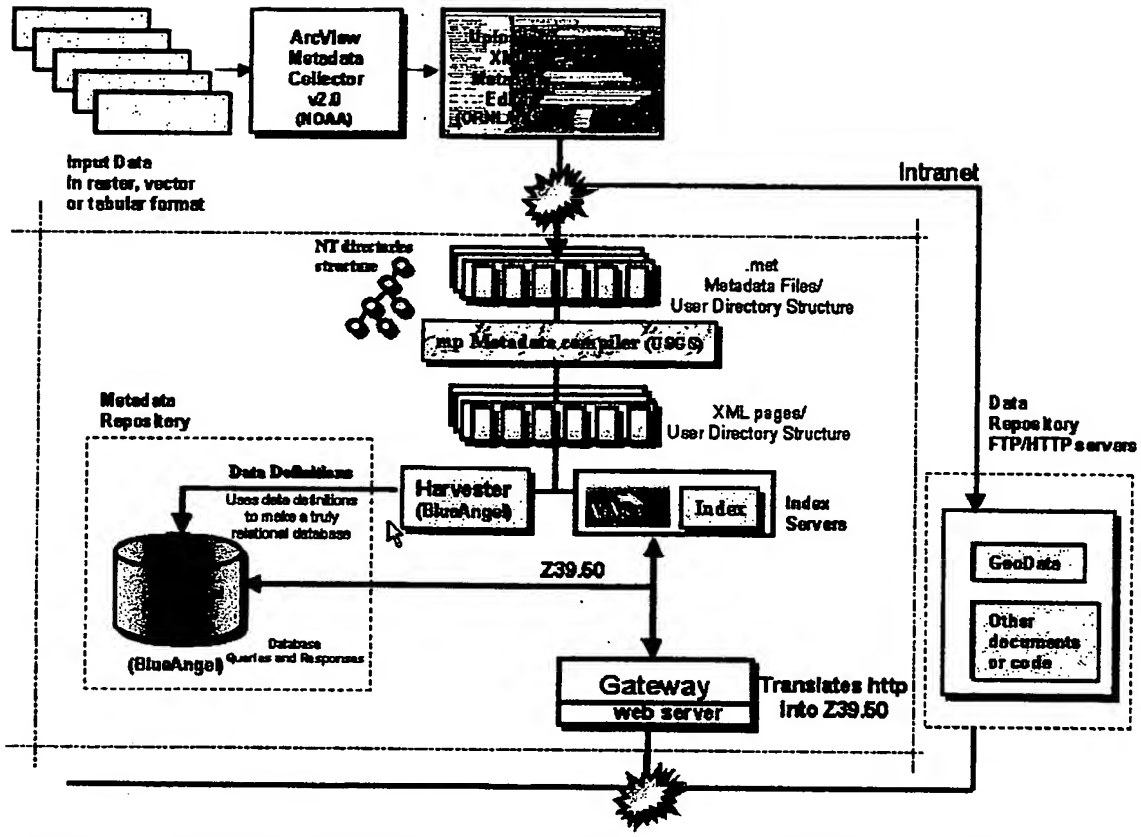

Figure 4. Proposed CNWRA Olympus DISS having as metadata uploader, the ORNL's Metadata editor

2.3. Steps in creating the system

All steps in the process will be planned and implemented following CNWRA TOP-18 guidelines.

a. Define the logical models for metadata content of vector/raster and Tabular spatial datasets Based on the FGDC standard;

b. Define the hardware infrastructure for creating the central metadata and data repository;

c. Create a hierarchical access of the metadata repository for CNWRA users;

d. Customize the ORNL's Metadata Editor for heterogeneous data types, providing a convenient way to enter information for each generic data type;

e. Create an initial set of metadata files as a component of the West Valley Demonstration Project (an example of WVDP metadata is presented in Appendix 3);

f. Purchase and configure the XML Metastar Server and several other index servers.

g. Create GUI Java and non-Java based search and retrieval interfaces

h. Add critical functionalities to the system, by including additional tools for visualizing data. One addition could be the CNWRA's distributed data visualization tool (PI. T. Eisenhut, E.Bachta, H. Thomas and S. Mohanty) or ArcExplorer - a freeware software from ESRI

j. Expand the system capabilities by creating a hierarchical mechanism of storing the data. Based on demand, the proposed system will deliver current mission-critical data in real and near real time. Some geospatial data could be archived on a high capacity slow response system, similar to the existing DVD server, and some could be stored on a digital library such as ATL P1000. The tape library could have one or two robots and could employ DLT7000 - high capacity magnetic tapes (i.e., 35G uncompressed or 70G compressed tapes).

3. BENEFITS OF THIS PROJECT TO CNWRA AND SWRI

There is a simple way of expressing what an enterprise is seeking today: competitive advantages through simple, organized and rapid access to knowledge. Benefits to CNWRA expected to accrue by developing the proposed Olympus DISS, will include:

- A easily accessible central data repository for all CNWRA geospatial data;
- Better data management at the group and division level; Research machines such as Pluto or Vulcan will be efficiently used just for research and analysis and not for long-term data storage;
- QA control;
- Redundant data will be reduced or even eliminated;
- A fast/ convenient way of accessing geospatial data. Data will be converted to a format easily operable with existing CNWRA licensed software;
- The weekly ITC backups will be more efficient in time and space requirements, since will serve only the current research data;
- If successful, the system could be implemented at other SwRI divisions, promoting data sharing between divisions.
- The costs envisioned in implementing this system are minimal.

4. REQUIREMENTS FOR IMPLEMENTATION OF THE PROOF OF CONCEPT

Immediate requirements

a) A dedicated Windows NT server with local administrator privileges;

b) XML Server and Metadata Database Server (Metastar produced by Blue Angel Technologies);

c) Purchase and installation of the following software packages: Perl Builder, Indigo Perl (free), XML Spy, Search Server (Hummingbird);

d) One part-time web designer/programmer;

e) ITC support

Long term requirements

a) Three part time/ full time students (two having training in Computer Science for developing the GUI interface and software developing issues, and one with earth science training in Geology/Geophysics/Hydrology to create the metadata sets);

b) Digital library for near-time data access and a Data Management Software (i.e., Veritas or Networker).

5. ACKNOWLEDGEMENTS

I am grateful to Darrell Sims, Dr. Brittain Hill and Deborah Waiting for their helpful comments and constructive reviews of the manuscript. My thanks goes also to Dr. Wesley Patrick and Dr. Larry McKague for support in developing this concept.

6. BIBLIOGRAPHY

Federal Geographic Data Committee. FGDC-STD-001-1998. Content standard for digital geospatial metadata (revised June 1998). Federal Geographic Data Committee. Washington, D.C.

FESIP, 2001, Federation of Earth Science Information Partners search page, web document, http://mercury.ornl.gov/esip/

ORNL, 2001, The Mercury Consortium, web document, http://mercury.ornl.gov/consortium.htm

Appendix 1

The Value of Metadata

Two very similar paintings of circus performers by Picasso from 1904 are put on the auction block; one brings tens of millions of dollars, the other hundreds of thousands. What is the difference? In one case, the ownership of the painting can be traced through sales slips and auction house records back to the estate of Picasso's dealer. The other painting appeared suddenly on the art market. It looks almost identical, but lacking documentation, how can one be sure it's authentic?

Just as a work of art can change hands many times, so can geospatial data. Once created, data can travel almost instantaneously through a network and be used for any number of different kinds of spatial analysis. Thus transformed, these data can be retransmitted to another user. Change is the essence of geospatial data in a networked environment. The word metadata shares the same Greek root as the word metamorphosis. Meta means change and metadata, or "data about data" describe the origins of and track the changes to geospatial data.

What are Metadata?

The concept of metadata is familiar to most people who deal with spatial issues. A map legend is pure metadata. The legend contains information about the publisher of the map, the publication date, the type of map, a description of the map, spatial references, the map's scale and its accuracy, among many other things. Metadata are simply that type of descriptive information applied to a digital geospatial file. They're a common set of terms and definitions to use when documenting geospatial data. Most digital geospatial files now have some associated metadata.

Why bother with Metadata?

Metadata helps people who use geospatial data find the data they need and determine how best to use it. Metadata benefit the data producing organization as well. As personnel change in an organization, undocumented data may lose their value. Later workers may have little understanding of the contents and uses for a digital data base and may find they can't trust results generated from these data. Lack of knowledge about other organizations' data can lead to duplication of effort. It may seem burdensome to add the cost of generating metadata to the cost of data collection, but in the long run it's worth it.

How can Metadata be produced?

The information needed to create metadata is often readily available when the data are collected. A small amount of time invested at the beginning of a project may save money in the future. Data producers and users cannot afford to be without documented data. The initial expense of documenting data clearly outweighs the potential costs of duplicated or redundant data generation. A recently developed metadata standard provides a systematic way to collect metadata.

Why use a standard?

When producing a map, the cartographer must organize all the descriptive information that goes into the map legend in a particular format. Titles are put in a specific place, tic marks are made a certain way, meters may be used instead of feet, and so forth. A metadata standard is simply a common set of terms and definitions that describe geospatial data.

What standard should be used?

The Federal Geographic Data Committee (FGDC) recently adopted a content standard for metadata. According to an Executive order signed by President Clinton on April 11, 1994, all Federal agencies will begin to use this standard to document newly created geospatial data as of January, 1995. This standard provides a consistent approach and format for the description of data characteristics. The standard was developed over a two-year period, with extensive review by professionals at all levels of government. The standard provides a way for data users to know:
what data are available whether the data meet their specific needs where to find the data how to access the data.
Because these standards are now in place, and large amounts of Federal data will be available in these standards, data managers from State and local governments and private industry will have an incentive to adopt these standards to document their own data. The FGDC is also sponsoring the creation of a National Geospatial Data Clearinghouse which will point users toward the spatial data that are best for their particular project. The intent is not to centralize all geographic data in one location, but to provide links through the Internet to distributed sites where data are produced or maintained. Managers who document their data using the metadata standards will provide these metadata to the National Geospatial Data Clearinghouse so that users can easily find data. Easier access to data will mean that a company's customers or an agency's cooperators could be increased.

Why use metadata?

Twenty-five years ago, humans landed on the Moon. Data from that era are still being used today, and it is reasonable to assume that today's geospatial data could still be used in the year 2020 and beyond to study climate change, ecosystems, and other natural processes. Metadata standards will increase the value of such data by facilitating data sharing through time and space.

The value of Picasso's painting did not depend solely on his having signed the work, a signature that could easily have been forged. Information about the painting, where it came from and where it had been, increased its value. So when a manager launches a new project, investing a small amount of time and resources at the beginning will pay dividends in the future.

Source: ORNL DAAC Metadata Editor 2/99

Appendix 2

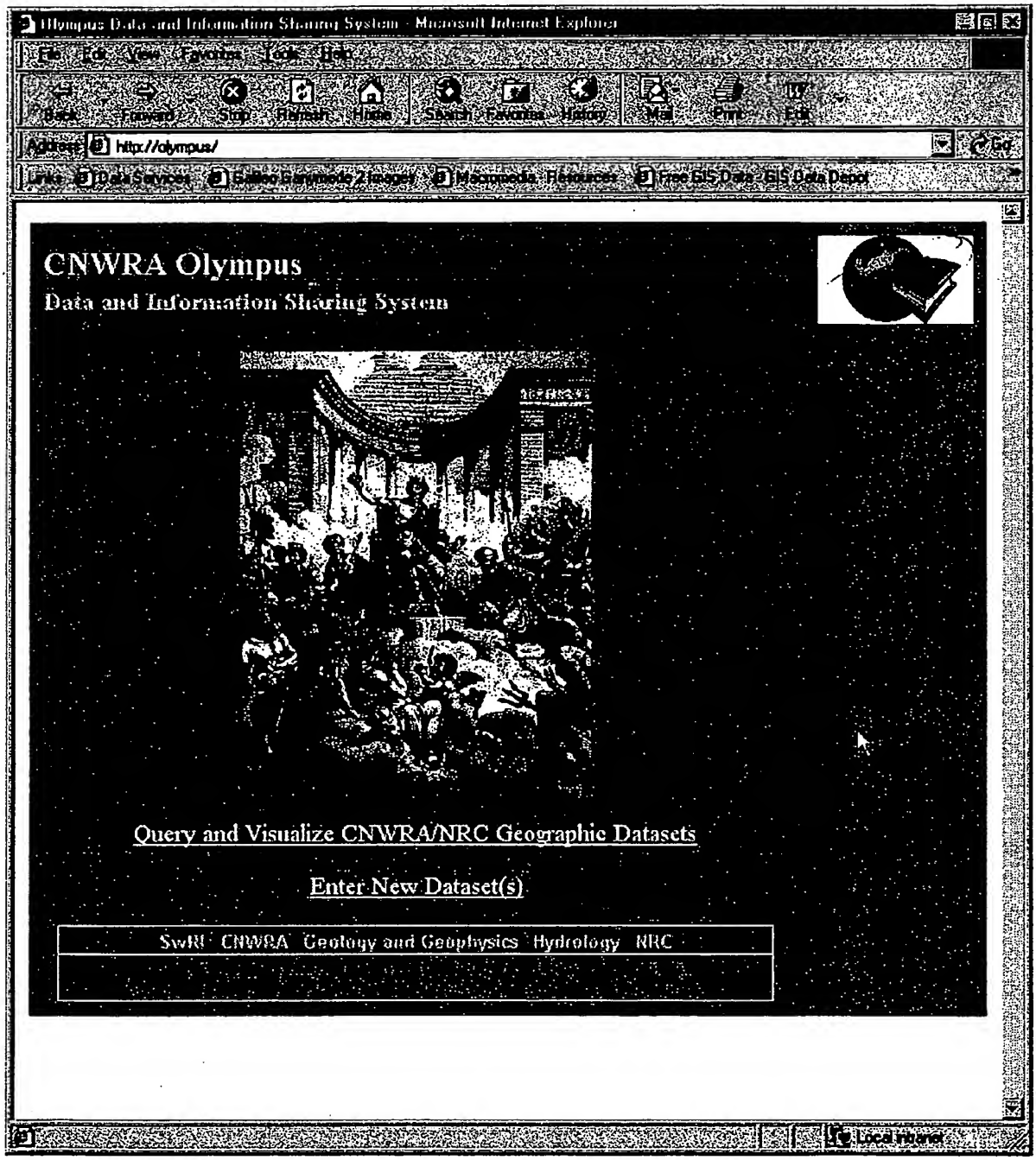

Figure 5. Olympus - Main Page

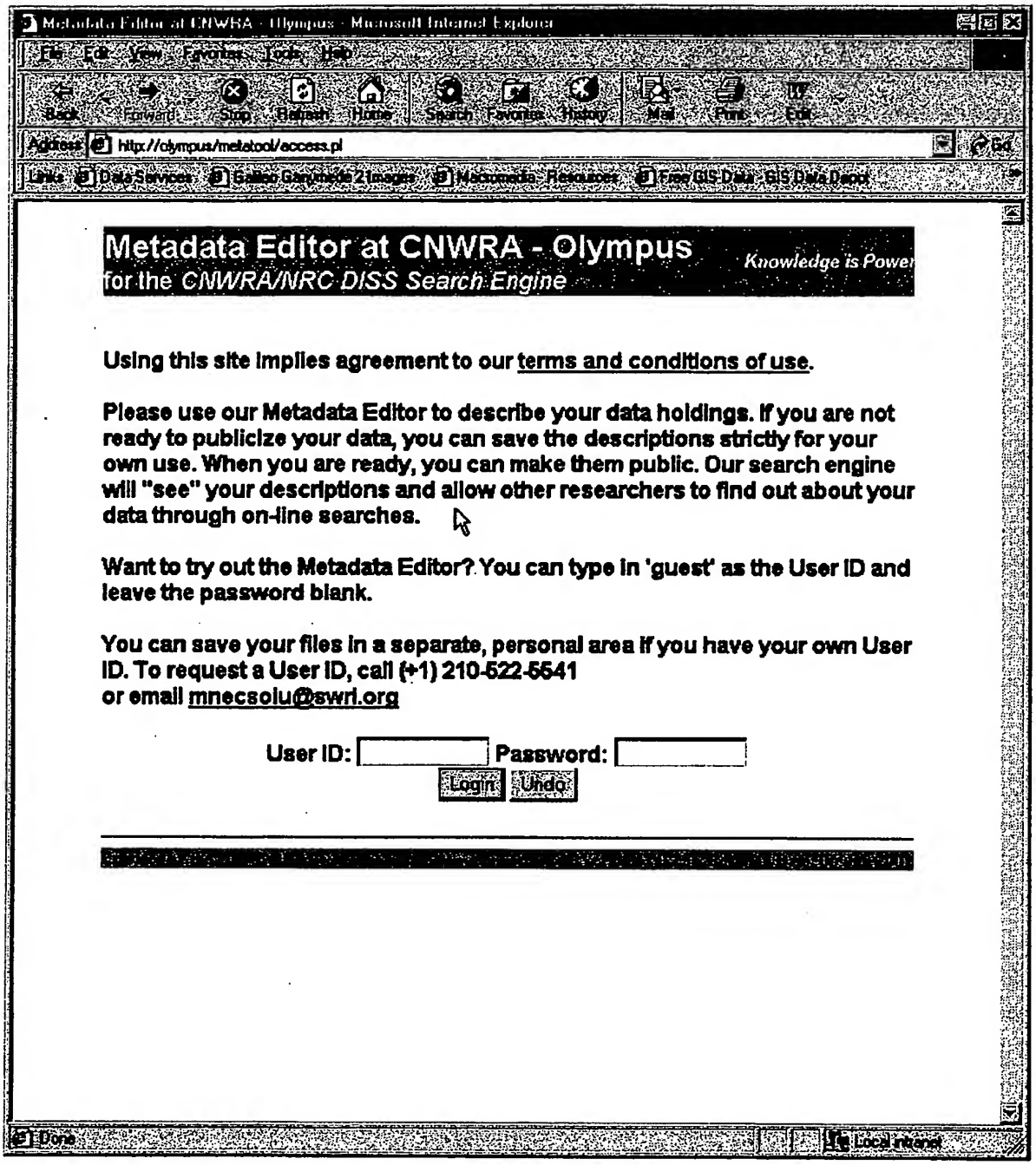

Figure 6. Olympus - Login Page

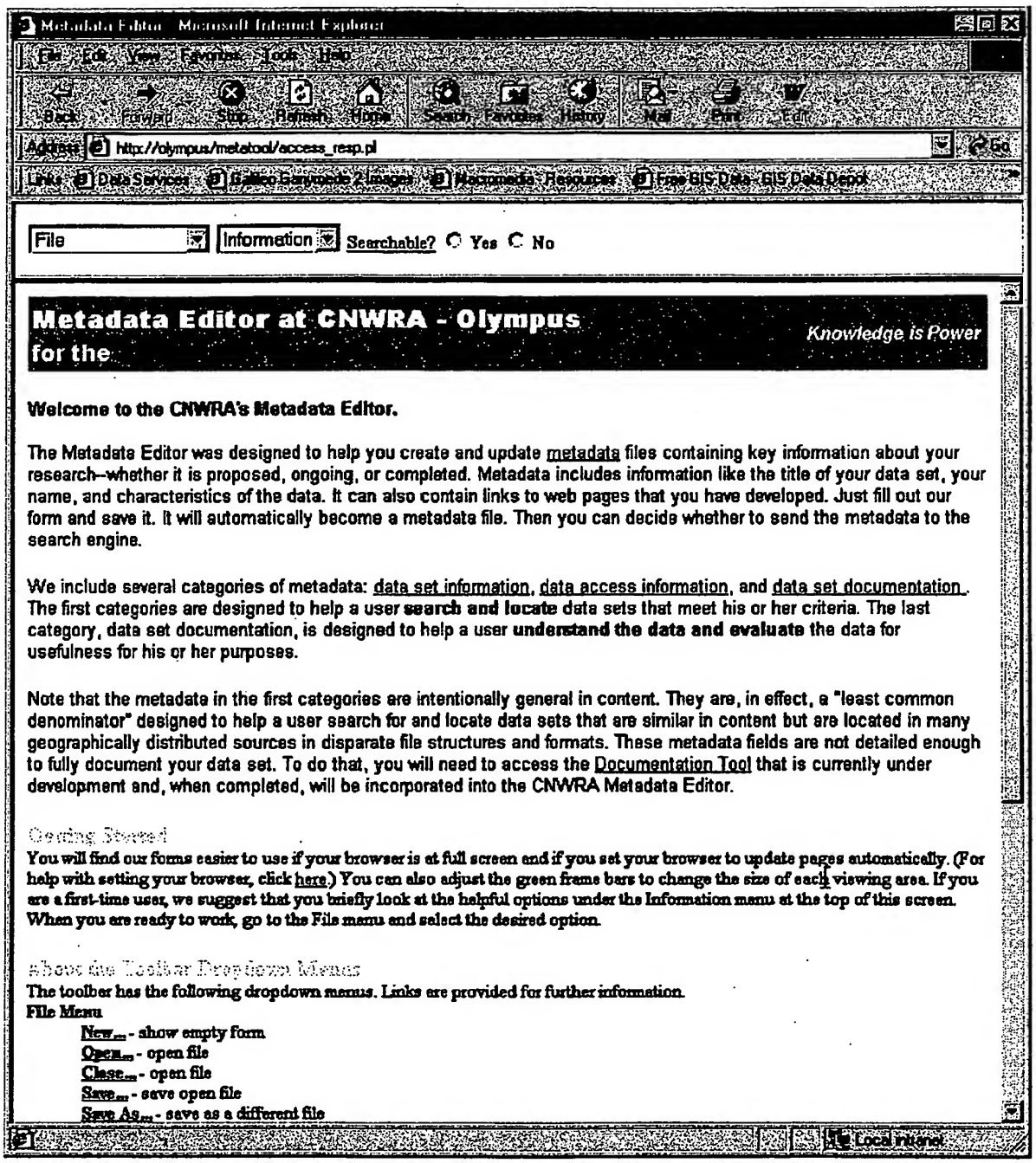

Figure 7. Olympus - Metadata Uploader/Editor

Appendix 3

GEOLOGY ArcView File - West Valley Project

Table of Contents

IDENTIFICATION_INFORMATION

Citation:
Citation_Information:
Originator: SwRI Center for Nuclear Waste Analysis (CNWRA)
Publication_Date: 20010618
Title: GEOLOGY ArcView File - West Valley Project
Edition: One
Geospatial_Data_Presentation_Form: Map
Publication_Information:
Publication_Place: San Antonio, Texas
Publisher: SwRI, CNWRA
Other_Citation_Details:
Online_Linkage: HTTP://www.swri.org/cnwra/westvalley
Larger_Work_Citation:
Citation_Information:
Originator: SwRi,CNWRA
Publication_Date: 20010618
Title: West Valley Geographic Information System
Publication_Information:
Publication_Place: San Antonio, Texas
Publisher: SwRI, CNWRA
Online_Linkage: HTTP://www.swri.org/cnwra/westvalley/data
Description:
Abstract:
The U.S. Nuclear Regulatory Commission (NRC) is participating as a cooperating agency in the development of the Environmental Impact Statement (EIS) to support decommissioning activities at the West Valley Demonstration Project and the larger West Valley site, located near Buffalo, New York. The geospatial, temporal, and geoenvironmental datasets for the site that will be used to

support evaluation of decommissioning alternatives can be viewed and processed in a geographic information system (GIS)/ three-dimensional visualization system. The NRC has requested the Center for Nuclear Waste Regulatory Analyses (CNWRA) to construct a GIS for the site that uses existing U.S. Department of Energy (DOE) data and takes into consideration NRC's present and future roles at the site. The GIS facilitates technical, decision-making, and regulatory analyses. By providing an easily accessible and evolving source of information on the site, and by allowing this information to be presented in visual displays, the GIS supports the NRC strategic goals of efficient regulation and increased public confidence. This report documents the design, implementation, and application of the GIS. In addition, the report documents problems encountered in implementing the design and suggests potential solutions that would allow a similar GIS design to be efficiently implemented at other sites.

Purpose:

The Geographic Information System (GIS) design for the West Valley Demonstration Project (WVDP) GIS constructed by the Center for Nuclear Waste and Regulatory Analysis (CNWRA) should prove to be very useful for accomplishing the goal of facilitating the US Nuclear Regulatory Commission's (NRC's) Environmental Impact Statement (EIS) review within the National Environmental Policy Act (NEPA) framework. CNWRA has developed a very innovative and practical design for accomplishing this task. The GIS design proves to be a very effective and efficient method of organizing and accessing the data obtained from the Department of Energy (DOE). The design is flexible enough to allow incorporation of additional data. A similar design could be implemented in any GIS developed for EIS review purposes at other sites.

Supplemental_Information:

The GIS does not incorporate data from sources outside of that provided by the DOE as part of their original dataset. Very little effort has been made to clarify or enhance the DOE data through modifications or further analysis.

Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date:
Ending_Date:
Currentness_Reference:

Status:
Progress: In work
Maintenance_and_Update_Frequency: Continually
Spatial_Domain:
Bounding_Coordinates: Geographic coordinates (latitude/longitude) in decimal degrees.
West_Bounding_Coordinate: 36.0 -111.0
East_Bounding_Coordinate: 36.5 -86.5
South_Bounding_Coordinate: 48.5 -84.0
North_Bounding_Coordinate: 49.5 -114.0
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: GIS
Theme_Keyword: EIS
Theme_Keyword: NEPA
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: United States
Place_Keyword: NorthWest
Place_Keyword: New York
Place_Keyword: Buffalo
Place_Keyword: West Valley
Access_Constraints:
Predecisional Report
Use_Constraints: None
Acknowledgement of the NRC and CNWRA would be appreciated in products derived from these data.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: SwRI CNWRA
Contact_Person: David Farrell
Contact_Position: Hydrologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6220 Culebra Rd.
City: San Antonio
State_or_Province: TX
Postal_Code: 78238
Country: United States
Contact_Voice_Telephone: 210-522-5208
Contact_Facsimile_Telephone: 210-522-5155
Contact_Electronic_Mail_Address: dfarrell@swri.org
Hours_of_Service: Monday-Friday, 8am-5pm, Central Standard Time
Native_Data_Set_Environment:

ArcView version 3.2 shapefile format
d:\wvdp-gis\gis\facility\boundary\geol.shp

DATA_QUALITY_INFORMATION

Attribute_Accuracy:
Attribute_Accuracy_Report:
No independent evaluation of the attribute or positional accuracy of the source data was undertaken. However, a series of coverage-based (global) diagnostic tests were run on each ArcUSA coverage to ensure data quality and integrity.

Logical_Consistency_Report:
These data are believed to be logically consistent, though no tests were performed. Line geometry is topologically clean.

Completeness_Report:
The boundary of the area is dependent on the shoreline and/or edges of rivers and bays as delineated on a USGS 7.5 minute Topographic Map. The edges or borders of the boundary might change as the natural land changes or better maps and aerial photography become available. The boundary was not based on legal parcels or definitions; therefore, the core boundary is a management/research boundary not a legal boundary.

Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
The data were created by delineating the boundary off a USGS 7.5 minute Topographic Map at 1:24000 scale. Therefore, the horizontal accuracy is assumed to be within National Map Accuracy Standards, with a horizontal accuracy of 45.6 feet at the 95% confidence level.

Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
The data were delineated off a USGS 7.5 minute Topographic Map at 1:24000 scale. Therefore, the vertical accuracy is assumed to be within National Map Accuracy Standards, with a vertical accuracy of 11.9 feet at the 95% confidence level.

Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Marius Necsoiu
Publication_Date: 20010618
Title: West Valley Demonstration Project
Edition: One

Geospatial_Data_Presentation_Form: map
Publication_Information:
Publication_Place: San Antonio, Texas
Publisher: SwRI, CNWRA
Other_Citation_Details:
Online_Linkage: HTTP://www.swri.org/cnwra/westvalley
Larger_Work_Citation:
Citation_Information:
Originator: SwRi,CNWRA
Publication_Date: 20010618
Title: West Valley Geographic Information System
Publication_Information:
Publication_Place: San Antonio, Texas
Publisher: SwRI, CNWRA
Online_Linkage: HTTP://www.swri.org/cnwra/westvalley/data
Source_Scale_Denominator: unknown
Type_of_Source_Media: CD-ROM
Source_Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date:
Ending_Date:
Source_Currentness_Reference: Publication Date
Source_Citation_Abbreviation:
Source_Contribution:
Process_Step:
NRC/DOE provided the necessary data to CNWRA and for processing into the ArcView shape file geol.shp.
Process_Description:
The original file was downloaded to a UNIX system. The ARC command IMPORT created coverage along with the INFO data file. The PROJECT command in ARC created a coordinate definition file (PRJ) to covert the coverage into Albers projection and the ARC command PRECISION was used with the option DOUBLE.
Source_Used_Citation_Abbreviation:
Process_Date: November 2001
Source_Produced_Citation_Abbreviation:
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Organization: SwRI CNWRA
Contact_Person: Marius Necsoiu
Contact_Position: GIS/Remote Sensing Specialist
Contact_Address:
Address_Type: mailing and physical address
Address: 6220 Culebra Rd.

City: San Antonio
State_or_Province: TX
Postal_Code: 78238
Country: United States
Contact_Voice_Telephone: 210-522-5541
Contact_Facsimile_Telephone: 210-522-5155
Contact_Electronic_Mail_Address: mnecsoiu@swri.org
Hours_of_Service: 0730-1615

SPATIAL_DATA_ORGANIZATION_INFORMATION

Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: GT-polygon composed of chains
Point_and_Vector_Object_Count: 11

SPATIAL_REFERENCE_INFORMATION

Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Map_Projection_Name: Geographic
Geographic:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: Coordinate pair
Coordinate_Representation:
Abscissa_Resolution:
Ordinate_Resolution:
Planar_Distance_Units: Feet
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Sphere
Semi-major_Axis: 20902179.3220430
Denominator_of_Flattening_Ratio: Infinity

ENTITY_AND_ATTRIBUTE_INFORMATION

Overview_Description:
Entity_and_Attribute_Overview:
Entity_and_Attribute_Detail_Citation:

DISTRIBUTION_INFORMATION

Distributor:

Contact_Information:
Contact_Organization_Primary:
Contact_Organization: SwRI CNWRA
Contact_Person: David Farrell
Contact_Position: Hydrologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6220 Culebra Rd.
City: San Antonio
State_or_Province: TX
Postal_Code: 78238
Country: United States
Contact_Voice_Telephone: 210-522-5208
Contact_Facsimile_Telephone: 210-522-5155
Contact_Electronic_Mail_Address: dfarrell@swri.org
Hours_of_Service: 0730-1615
Resource_Description:
Distribution_Liability:

METADATA_REFERENCE_INFORMATION

Metadata_Date: 20010623
Metadata_Review_Date:
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: SwRI CNWRA
Contact_Person: Marius Necsoiu
Contact_Position: GIS/Remote Sensing Specialist
Contact_Address:
Address_Type: Mailing and physical address
Address: 6220 Culebra Rd.
City: San Antonio
State_or_Province: TX
Postal_Code: 78238
Country: United States
Contact_Voice_Telephone: 210-522-5541
Contact_Facsimile_Telephone: 210-522-5155
Contact_Electronic_Mail_Address: mnecsoiu@swri.org
Hours_of_Service: 0730-1615
Metadata_Standard_Name: FGDC CSDGM
Metadata_Standard_Version: FGDC-STD-001-1998

AGU EOS poster
Dec 2002

CNWRA
A center of excellence in earth sciences and engineering

OLYMPUS DISS™
A Readily Implemented Geographic Data and Information Sharing System

Markus Nasoclu
Brandi Wimfrey
Katherine Murphy
Larry McKague

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1 Abstract

Electronic information technology has become a crucial component of business, government, and scientific organizations. In this technology era, many enterprises are moving away from the perception that information repositories are only a tool for decision-making. Many organizations are learning that information systems, which are capable of organizing and following the interrelations between information and both the short-term and strategic organizational goals, are assets themselves, with inherent value.

Olympus Data and Information Sharing System (DISS) is a system developed at the Center for Nuclear Waste Regulatory Analyses (CNWRA) to solve several difficult problems associated with the management of geographical, geological and geophysical data. Challenges were to (i) organize the large amount of heterogeneous information that has accumulated over many years, (ii) store the data in a central, knowledge-based, searchable database and (iii) create quick, easy convenient, and reliable access to that information.

Olympus DISS is a solution that can be easily adapted to small and mid-size enterprises dealing with heterogeneous geographic data. It uses established data standards, provides a flexible mechanism upon which to build applications and renders geographic data in multiple and clear ways.

2 Problems

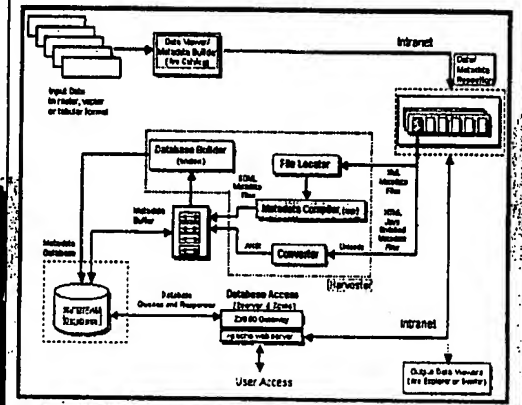
Data is unorganized and dispersed among various systems and locations.

Several copies of a single dataset are stored on different machines.

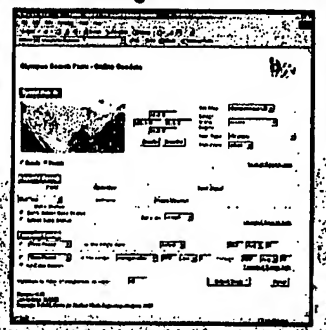
Data are difficult to access or even screen.

Data storage is a sub-optimal use of research computers.

5 The Solution: Olympus DISS

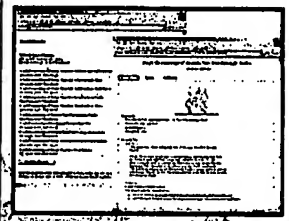


6 Search Page



Users can search by spatial, keyword, or temporal criteria. The spatial search allows users to draw a box around the desired area on a map or enter latitude/longitude coordinates. The keyword search is similar to an Internet search engine. The temporal search locates data either by publication dates or by the date of data collection.

7 Results Pages



The search results page and a metadata page for one of the records are shown above. The metadata page displays a thumbnail of the image, allowing users to quickly identify and evaluate the data without wading through cumbersome text. Users can read further to determine whether the image will be appropriate for their projects. The image file is then downloaded from links on the metadata page.

3 Design Criteria

Flexibility: Accept multiple data formats, such as raster, vector, and tabular.

Minimum Training: User friendly interface to minimize time spent learning the system and entering data.

Maximum Exposure: Accessible over Internet; can incorporate data from multiple sources.

Controlled Access: Individual researchers control who can access their data.

4 What is Metadata?

Metadata is data about data. It is the who, what, when, where, and why of data. The metadata for a geographic dataset will include information such as:

Who: Organization and/or person responsible for the GIS data

What: Description of the GIS data

When: Date and time that the dataset was created, and also the date it was published

Where: Location of the GIS data in [illegible]

Data flow of Olympus consists of a web page front-end interacting with the web server (Apache), which interfaces with the Z39.50 Gateway. Isite and its components zserver and zgate, developed and maintained by CNIDR, provides access to database systems via the ANSI/NISO Z39.50 search and retrieval protocol. Olympus has four major components, (i) Data Viewer/Metadata Builder, (ii) Data/Metadata Repository, (iii) Relational Database, and (iv) Harvester. The GIS Data/Metadata Repository is filled with Metadata created by ArcCatalog and located by the Harvester. The Harvester is composed of the Converter, the File Locator, the Metadata Compiler (mp), and the Database Builder. The Database Builder is based on find software, included in the Isite package. The Metadata Compiler is based on mp, produced by USGS. Both the Database Builder and Metadata Compiler are managed by the Harvester.

8 Data Visualization

Data can be viewed using ArcExplorer, a visualization program available at no cost from the ESRI website.

9 Benefits

Easily accessible central data repository for geospatial data allows for better data management.

Research machines are not burdened by long-term data storage.

Unwanted data are reduced.

Quality assurance control is facilitated.

Implementation costs are minimal.

This poster was prepared at Southwest Research Institute® (SwRI®) under Contract No. NRC-02-97-009. The activities reported here were performed on behalf of the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Material Safety and Safeguards. The opinions expressed in this poster are those of the authors and do not necessarily reflect those of the NRC.